

CLAIMS

*What is claimed is:*

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1. A Foreign Agent that supports Mobile IP, the Foreign Agent being capable of registering a node with a Home Agent that supports Mobile IP, comprising:

a processor; and

a memory, the memory storing therein the following instructions:

instructions for receiving a node attachment message from an access point, the node attachment message indicating that the node is in a vicinity of the Foreign Agent when in a first state and that the node is not in a vicinity of the Foreign Agent when in a second state;

instructions for initiating registration on behalf of the node when the node attachment message is in the first state; and

instructions for initiating de-registration on behalf of the node when the node attachment message is in the second state.

2. The Foreign Agent as recited in claim 1, wherein the node attachment message includes an IP address of the node that attached to the access point.

3. The Foreign Agent as recited in claim 1, further comprising:

instructions for sending an attachment acknowledgement message to the access point, the attachment acknowledgement message indicating that the node is fixed when the attachment acknowledgement message is in a first state and indicating that the node is mobile when the attachment acknowledgement message is in a second state.

4. The Foreign Agent as recited in claim 3, wherein the attachment acknowledgement message includes an IP address of the node that attached to the access point.

5. A Foreign Agent that supports Mobile IP, the Foreign Agent being capable of registering a node with a Home Agent that supports Mobile IP, comprising:

a processor; and

a memory, the memory storing therein the following instructions:

instructions for receiving a node attachment arrive message from an access point, the node attachment arrive message indicating that the node is in a vicinity of the Foreign Agent;

instructions for composing a registration request on behalf of the node;

instructions for sending the registration request to the Home Agent;

instructions for receiving a registration reply from the Home Agent in response to the registration request; and

instructions for sending an attachment acknowledgement message to the access point indicating whether the node is capable of receiving packets via the Foreign Agent.

6. The Foreign Agent as recited in claim 5, wherein the attachment acknowledgement message indicates that the node has been successfully registered with the Home Agent.

7. The Foreign Agent as recited in claim 5, further comprising:

instructions for determining from an access list whether the node is allowed to roam in a subnet of the Foreign Agent;

wherein the attachment acknowledgement message indicates that the node is capable of receiving packets via the Foreign Agent when the node is allowed to roam in a subnet of the Foreign Agent and otherwise indicates that the node is not capable of receiving packets via the Foreign Agent.

8. The Foreign Agent as recited in claim 5, wherein the attachment acknowledgement message indicates whether the access point is instructed to redirect

packets sent by the node to a MAC address of the Foreign Agent, thereby enabling the node to send packets via the Foreign Agent.

3 9. The Foreign Agent as recited in claim 5, wherein the attachment  
5 acknowledgement message indicates that the access point is instructed to provide fixed wireless connectivity when in a first state and to provide proxy mobility service when in a second state.

10. The Foreign Agent as recited in claim 5, wherein the node supports Mobile IP.

11. The Foreign Agent as recited in claim 5, wherein the node does not support Mobile IP.

12. The Foreign Agent as recited in claim 5, wherein the registration request includes a MAC address and an IP address associated with the node.

15 13. The Foreign Agent as recited in claim 5, wherein the attachment  
acknowledgement message indicates that the node is capable of receiving packets via the Foreign Agent when the registration reply indicates that registration of the node with the Home Agent was successful, and wherein the attachment acknowledgement message otherwise indicates that the node is not capable of receiving packets via the  
20 Foreign Agent.

14. The Foreign Agent as recited in claim 5, further comprising:

instructions for establishing a communication link between the Foreign Agent and the access point such that the communication link supports proxy Mobile Node service.

5        15.     The Foreign Agent as recited in claim 14, wherein the instructions for establishing the communication link between the Foreign Agent and the access point comprise:

instructions for receiving an agent solicitation from the access point, the agent solicitation indicating that the access point supports proxy Mobile Node service; and

instructions for sending an agent advertisement from the Foreign Agent to the access point, the agent advertisement indicating that the Foreign Agent provides proxy Mobile Node service.

16.     The Foreign Agent as recited in claim 15, wherein the agent advertisement includes an agent advertisement extension indicating that the Foreign Agent provides proxy Mobile Node service.

17.     The Foreign Agent as recited in claim 16, wherein the agent advertisement extension includes an IP address field and a MAC address field for identifying an IP address and a MAC address that are shared by two or more Foreign Agents.

20        18.     The Foreign Agent as recited in claim 5, further comprising:

instructions for determining a home subnet for the node from a routing table using an IP address of the node;

instructions for sending a first registration request, the first registration request including a subnet directed broadcast address identifying the determined home subnet;

instructions for receiving a registration reply from one or more Home Agents, each registration reply including an IP address for the associated Home Agent; and

instructions for sending a second registration request to one of the Home Agents, the second registration request including the IP address for the one of the Home Agents.

19. The Foreign Agent as recited in claim 18, wherein the IP address of the node is assigned by a DHCP server.

20. A Foreign Agent that supports Mobile IP, the Foreign Agent being capable of de-registering a node with a Home Agent that supports Mobile IP, comprising:

a processor; and

a memory, the memory storing therein the following instructions:

instructions for receiving a node attachment leave message from an access point, the node attachment leave message indicating that the node is no longer in a vicinity of the Foreign Agent;

instructions for composing a de-registration message on behalf of the node;

instructions for sending the de-registration message to the Home Agent; and

instructions for updating a visitor table to indicate that the node is no longer visiting the Foreign Agent.

21. The Foreign Agent as recited in claim 20, further comprising:

5 instructions for sending an attachment acknowledgement message to the access point indicating that the node is no longer capable of receiving packets via the Foreign Agent.

22. The Foreign Agent as recited in claim 20, wherein the node supports Mobile IP.

23. The Foreign Agent as recited in claim 20, wherein the node does not support Mobile IP.

24. An access point capable of communicating with a Foreign Agent that supports Mobile IP and being capable of redirecting packets received from a node that has registered with a Home Agent that supports Mobile IP via the Foreign Agent, comprising:

a processor; and

a memory, the memory storing therein the following instructions:

instructions for detecting the node when it is in a vicinity of the Foreign Agent;

instructions for sending a node attachment arrive message to the Foreign Agent, the node attachment arrive message indicating that the node is in a vicinity of the Foreign Agent; and

instructions for receiving an attachment acknowledgement message indicating whether the node is capable of receiving packets via the Foreign Agent.

25. The Foreign Agent as recited in claim 24, wherein the attachment acknowledgement message indicates that the access point is instructed to provide fixed wireless connectivity when in a first state and to provide proxy mobility service when in a second state.

26. The access point as recited in claim 24, wherein the node supports Mobile IP.

27. The access point as recited in claim 24, wherein the node does not support Mobile IP.

28. The access point as recited in claim 24, further comprising:

instructions for updating a remap table with an entry indicating that a destination MAC address specified in a packet received from the node is to be remapped to a MAC address of the Foreign Agent.

29. The access point as recited in claim 24, further comprising:

instructions for intercepting a packet addressed from the node to a destination MAC address; and



instructions for redirecting the packet to a MAC address of the Foreign Agent.

30. The access point as recited in claim 24, further comprising:

instructions for sending a node attachment leave message to the Foreign Agent, the node attachment leave message indicating that the node is no longer in a vicinity of the Foreign Agent.

31. The access point as recited in claim 30, further comprising:

instructions for receiving an attachment acknowledgement message from the Foreign Agent indicating that the node is no longer capable of receiving packets via the Foreign Agent.

32. The access point as recited in claim 30, further comprising:

instructions for removing an entry from a remap table, the entry indicating that packets addressed from the node to a destination MAC address are to be remapped to a MAC address of the Foreign Agent.

33. A computer-readable medium storing thereon computer-readable instructions for registering a node visiting a Foreign Agent that supports Mobile IP with a Home Agent that supports Mobile IP, comprising:

instructions for receiving a node attachment message from an access point, the

node attachment message indicating that the node is in a vicinity of the Foreign Agent when in a first state and that the node is not in a vicinity of the Foreign Agent when in a second state;

instructions for initiating registration on behalf of the node when the node attachment message is in the first state; and

instructions for initiating de-registration on behalf of the node when the node attachment message is in the second state.

34. A computer-readable medium storing thereon computer-readable instructions for registering a node that is visiting a Foreign Agent that supports Mobile IP with a Home Agent that supports Mobile IP, comprising:

instructions for receiving a node attachment arrive message from an access point, the node attachment arrive message indicating that the node is in a vicinity of the Foreign Agent;

instructions for composing a registration request on behalf of the node;

instructions for sending the registration request to the Home Agent;

instructions for receiving a registration reply from the Home Agent in response to the registration request; and

instructions for sending an attachment acknowledgement message to the access point indicating whether the node is capable of receiving packets via the Foreign Agent.

2 35. A computer-readable medium storing thereon computer-readable instructions for de-registering a node that was visiting a Foreign Agent that supports Mobile IP with a Home Agent that supports Mobile IP, comprising:

instructions for receiving a node attachment leave message from an access point, the node attachment leave message indicating that the node is no longer in a vicinity of the Foreign Agent;

instructions for composing a de-registration message on behalf of the node;

instructions for sending the de-registration message to the Home Agent; and

instructions for updating a visitor table to indicate that the node is no longer visiting the Foreign Agent.

36. A Foreign Agent that supports Mobile IP, the Foreign Agent being capable of registering a node with a Home Agent that supports Mobile IP, comprising:

means for receiving a node attachment message from an access point, the node attachment message indicating that the node is in a vicinity of the Foreign Agent when in a first state and that the node is not in a vicinity of the Foreign Agent when in a second state;

means for initiating registration on behalf of the node when the node attachment message is in the first state; and

5 means for initiating de-registration on behalf of the node when the node attachment message is in the second state.

37. A Foreign Agent that supports Mobile IP, the Foreign Agent being capable of registering a node with a Home Agent that supports Mobile IP, comprising:

means for receiving a node attachment arrive message from an access point, the node attachment arrive message indicating that the node is in a vicinity of the Foreign Agent;

means for composing a registration request on behalf of the node;

means for sending the registration request to the Home Agent;

means for receiving a registration reply from the Home Agent in response to the registration request; and

means for sending an attachment acknowledgement message to the access point indicating whether the node is capable of receiving packets via the Foreign Agent.

38. A Foreign Agent that supports Mobile IP, the Foreign Agent being capable of de-registering a node with a Home Agent that supports Mobile IP, comprising:

means for receiving a node attachment leave message from an access point, the node attachment leave message indicating that the node is no longer in a vicinity of the Foreign Agent;

means for composing a de-registration message on behalf of the node;

means for sending the de-registration message to the Home Agent; and

means for updating a visitor table to indicate that the node is no longer visiting the Foreign Agent.

24 39. An access point capable of communicating with a Foreign Agent that supports Mobile IP and being capable of redirecting packets received from a node that has registered with a Home Agent that supports Mobile IP via the Foreign Agent, comprising:

means for detecting the node when it is in a vicinity of the Foreign Agent;

means for sending a node attachment arrive message to the Foreign Agent, the node attachment arrive message indicating that the node is in a vicinity of the Foreign Agent; and

means for receiving an attachment acknowledgement message indicating whether the node is capable of receiving packets via the Foreign Agent.